Observations on the Local Use of Hydrochloric Acid in Bone Necrosis of Tuberculous Origin.

BY

JEROME HILTON WATERMAN, M. D.

REPRINTED FROM THE

New York Medical Journal

for August 8, 1896.

Reprinted from the New York Medical Journal,
for August 8, 1896.

OBSERVATIONS ON THE LOCAL USE OF HYDROCHLORIC ACID IN BONE NECROSIS OF TUBERCULOUS ORIGIN.

*WITH A REPORT OF CASES.**

By JEROME HILTON WATERMAN, M. D.

Having been invited to report my observations on the local use of hydrochloric acid in bone necrosis of tuberculous origin, I will present the results of a series of cases which I have recently treated by this method at the Hospital for the Ruptured and Crippled, New York.

There were in the hospital at this time several cases of necrosed bone of tuberculous origin which failed to respond to the usual method of treatment. In some of these the most radical operative means had been employed, the bone being thoroughly curetted and all the necrosed tissue supposed to have been removed. Sinuses subsequently formed, and an examination under an anæsthetic revealed the fact that necrotic bone was still present. In the other cases of the series, irrigation with

* Read by invitation before the American Orthopædic Association a its tenth annual congress, May, 1896.

solutions of bichloride of mercury, hydrogen peroxide, packing with various kinds of gauze, and the injection of creosote and protonuclein into the sinuses had been painstakingly employed for many months without favorable results, either in decreasing the amount of discharge or in allaying the progressive character of the pathological condition. Confronted with these unsatisfactory results, I resolved to try the application of hydrochloric acid. We find by experiment that the action of the acid on healthy bone is limited to the decomposition of the mineral constituents, consisting principally of phosphates and carbonates of calcium, together with small quantities of the alkaline salts; so far as we know, not affecting the animal matter. Since in necrosed bone we have only these mineral salts remaining, the chemical action of the acid is more particularly confined to the diseased part, dissolving it without exerting any destructive influence on the underlying tissue. In this fact lies one of the real merits of the treatment, for the diseased tissue being removed, the process of reparation can go on unobstructed.

Now, as to the method of employment: The acid was used in the concentrated form, whereas heretofore for the most part dilute solutions and solutions in combination with various substances have been used by other writers. The number of minims injected in each individual case depended, of course, on the amount of bone which was diseased and on the general condition of the patient. It is preferable not to use the acid more than twice a week, owing to the reaction and pain which might result. However, contrary to expectation, but little pain was experienced, and this I attribute in part to the fact that the patients were accustomed to more or

less manipulation, having been dressed daily for several months, and also to the anæsthetic effect of the acid. In case it should produce undue discomfort, it is advisable to spray the tissues with a four-per-cent. solution of cocaine or cocaine and morphine a few minutes before injecting the acid; or I would suggest as an admirable substitute the chloride-of-ethyl spray. It was my custom to thoroughly wash out the sinus with sterilized water in order to remove any pus or detritus, and thus permit the acid to penetrate all of the diseased bony tissue.

The ordinary sterilized glass pipette was found to be the most practical means for the application of the acid. The tube was introduced to the bottom of the sinus and the contents deposited directly upon the necrosed structure. After this, I usually allowed a minute to elapse, then irrigated the sinus with a saturated solution of bicarbonate of sodium, and then applied a wet myrrh dressing. My object in using the latter in preference to dry dressings was because of the marked fetor noticed in many instances after the first two or three injections. This is accounted for by the destruction of soft tissues, and was more pronounced when the patient moved and the application was not made directly to the bone, but dropped partly on the surrounding tissues.

In certain cases of the series it was necessary to enlarge the opening during the course of treatment, particularly when the granulations were so exuberant as to protrude into the lumen of the sinus, but in the majority of instances they could be removed by the introduction of a probe.

Having described in a general way the method of application, it will be of interest to relate the existing

conditions at the time the treatment was begun, as well as the final results attained.

CASE I.—V. B., aged ten years. Diagnosis: left hip disease, third stage. The patient was admitted into the hospital in July, 1894. In August, a large abscess on the antero-external part of the thigh opened spontaneously. Since that time the discharge has been profuse. In January, 1896, an examination showed the presence of a small amount of necrosed bone, and hydrochloric-acid applications were begun. There were two minims injected twice a week for the first five weeks and no improvement noticed; so I decided to increase the amount to six minims a week for the next three months, after which it was discontinued on account of the patient's general weakened condition. An examination last week, four and a half months after the inception of the treatment, showed that the sinus had so completely closed as to render it impossible to insert a probe into the opening.

CASE II.—M. S., aged thirteen years. Diagnosis: left hip disease, third stage. This child was admitted December 18, 1894. In August, 1895, a deep femoral abscess was detected and an excision of the hip was performed. Suppuration followed, and daily irrigation with various antiseptics producing no effect, the acid treatment was begun. The patient presented at this time an opening on the anterior aspect of the thigh and another leading to the ilium. Into both sinuses were injected four minims of the acid twice a week, receiving in all ten applications. During the course of the treatment the dressings were so fœtid that it was necessary to keep the patient apart from the others in the ward, but I do not attribute this to the acid alone, as the same condition existed to some extent prior to the treatment. The discharge was much less after the first six weeks, but at the present time the sinuses have shown no tendency to close.

CASE III.—W. B., aged eight years. Diagnosis: right hip disease, third stage. The child was admitted into

the hospital in May, 1893. There being some fluctuation about the hip joint, the patient was aspirated, and later an incision was made in order to establish better drainage. In January, 1895, there were four sinuses around the joint, all discharging copiously. Since all efforts to heal them proved futile, in January, 1896, the patient began having injections of the acid. As the sinuses were thought to communicate, only the one on the anterior part of the thigh was injected, three minims twice a week being applied. The discharge decreased and the sinuses gradually became smaller, but the general condition of the patient in this case was so poor that treatment had to be discontinued. Three weeks ago the child was removed from the hospital and has since died of phthisis.

Case IV.—A. V., aged five years. Diagnosis: tuberculous osteitis of the right knee. This child was admitted into the hospital November 13, 1895. The patient had a sinus over the anterior surface of the head of the tibia, which has been dressed daily for five months. In January, 1896, the applications of the acid were commenced and continued twice a week for ten weeks. One month after its discontinuance the sinus was nearly closed.

Case V.—W. C., aged four years and six months. Diagnosis: right hip disease, third stage. The patient entered the hospital in March, 1895. In October the bone was curetted under ether. After two weeks the sinus again opened into the wound. Three months later, when I began injecting the acid, there was on the upper posterior aspect of the thigh a large sinus leading to the bone. Two minims were introduced twice a week for four months. As there was no improvement, I abandoned the treatment.

Case VI.—A. K., aged twelve years. Diagnosis: left hip disease, third stage. This case was admitted in January, 1895. The child had an abscess opened in another hospital before entering here. An examination showed a deep sinus on the external part of the thigh

and another posteriorly. The former was treated with hydrochloric acid and the latter packed with iodoform gauze at each dressing. The sinus thus treated with the acid has entirely healed, while the other still discharges profusely.

CASE VII.—W. M., aged nine years. Diagnosis: spinal disease involving the lower dorsal vertebræ. The case was admitted in October, 1894. An abscess over the twelfth dorsal vertebra was aspirated and four ounces of pus withdrawn. An incision was afterward made to establish drainage. After being dressed four times a week for eight months and no noticeable improvement resulting, I commenced using hydrochloric acid, injecting three minims twice a week for four months. At the present time the sinus is not entirely healed, but the discharge is very much diminished. The patient will remain under the same treatment for another month, as this is an unusually large sinus with more necrosis present than in the other cases of the series.

CASE VIII.—M. P., aged five years. Diagnosis: left hip disease, third stage. The child was received in February, 1895, when an excision of the hip was performed. The patient was discharged in June, but readmitted in August, having marked infiltration about the joint and discharging sinuses on both the anterior and posterior aspect of the femur. In September the sinuses were curetted, under an anæsthetic. A few weeks afterward, however, they again began to discharge and daily irrigations of bichloride of mercury (1 to 5,000) were used. This treatment was continued for three and a half months, after which the acid was applied. Four minims were introduced into each sinus twice a week for four months and a half, and at the present writing both of them are closed.

In these eight cases I can record four apparent cures. In numbers two and five I would suggest the possibility that either the necrosed area was larger than the probe indicated, so that not sufficient acid has as yet been ap-

plied to effect its solution, or that another area of necrosis exists at some distant point not determined by the probe. Should these conditions be present, operative methods are necessary.

The conclusions which may be drawn from the above cases are as follows:

1. No evil effects have resulted from its use.

2. The use of the acid in its concentrated form is preferable.

3. When the area of necrosis is extensive, operative methods are advised.

4. Its action is limited to the necrosed area; whereas curetting may remove both diseased and healthy bone.

5. By the disintegration of the dead bone the newly formed tissue has a better opportunity for its more rapid development.

I feel warranted in stating that the further use of hydrochloric acid as a local application in the treatment of bone necrosis of tubercular origin is not only justifiable, but deserving the attention of the medical profession.

I am greatly indebted to Dr. Virgil P. Gibney, the surgeon in chief of the Hospital for the Ruptured and Crippled, for the many and valuable suggestions given for carrying out these observations.